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the FERTILIZER situation for 1961-1962

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A report of the Agricultural Chemicals Staff
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~~THE FERTILIZER SITUATION FOR 1961-62~~

The supply of fertilizers for 1961-62 is expected to total 8,788,000 tons in terms of the primary plant nutrients: nitrogen (N), phosphate (P_2O_5) and potash (K_2O). This tonnage is twice the quantity available in 1949-50 and 12 percent more than in 1960-61.

Estimates in this report are based on such indicators of market conditions as rates of production and stock trends during the first six months of the fertilizer year, as well as foreign trade statistics and prospects.

The fertilizer trade is now faced with more than the usual uncertainties which might have an immediate and potent influence on the movement of fertilizers. For instance, the fertilizer requirements of the Agency for International Development (AID) for 1961-62 from domestic supplies as yet are not definite. Furthermore, world market conditions are unsettled by the prospect of new production in countries now importing fertilizers, shipments financed by U.S. foreign aid funds, and purchases from the free world by Communist China. Also, domestic producers having surplus capacity may be cautious in scheduling their production in the months ahead.

Besides these special uncertainties, there are those usual at this time of year. Unfavorable weather conditions have held up fertilizer application in many areas, adding to the pressure on deliveries during the peak of the season. Proposals for changes in agricultural legislation and new legislation might cause sudden shifts in farmers' intentions to fertilize certain crops.

Many farmers now expect their fertilizer to be delivered, often custom spread as well, when weather conditions are right for immediate application. This intensifies the customarily seasonal movement of fertilizers. In an effort to meet this increase in seasonality of demand, primary producers have expanded plants, constructed new ones, put in extra storage facilities and acquired improved handling equipment so as to deliver a record quantity of materials in the short period during which farmers will take them.

Note: The fertilizer year is from July 1 through June 30.

A late season and possible issuance of additional AID tenders for domestic materials might cause a demand for more fertilizer than available handling equipment could deliver during the peak period of fertilizer application in the United States. Under these conditions producers may not be able to make immediate delivery on spot orders.

Nitrogen (N)

Domestic supplies of nitrogen for fertilizers in 1961-62 are expected to total 3,269,000 tons, an increase of 6 percent over 1960-61 (table 1).

Production of anhydrous ammonia has for several years followed a fairly definite seasonal pattern from a late-summer low to a peak in May. Lateness of the season in both 1960-61 and 1961-62 caused heavy demand to continue into July, postponing to September the replenishment of inventories usually occurring in August (figure 1). In recent years production each month has been above the same month of the previous year, with one slight exception (October 1960). Production of this basic nitrogenous material in the first six months of this year was about 7 percent over the same period of last year. Anhydrous ammonia for direct application and formulation of mixed fertilizers is expected to increase about 7 percent. Supplies of solid ammonium nitrate will be up about 4 percent. Production of nitrogen solutions was slower during the first half of this year but is expected to make a slight gain by the end of June. Coke-oven production of byproduct ammonium sulfate is up, while synthetic (including byproduct) is down. Total domestic supplies of ammonium sulfate are expected to be greater than in 1960-61. However, improved technology in the manufacture of mixed fertilizers and increasing transportation costs have weakened the competitive position of ammonium sulfate in the domestic market. Urea production is up and the quantity of solid urea for fertilizer purposes will be over one-fourth more than in the previous year.

Total imports of nitrogen are expected to be about 3.6 percent larger than last year. Ammonium sulfate, urea, ammonium phosphates, nitrogen solutions and other synthetic nitrogenous fertilizers from Canada, the Netherlands and Norway will account for most of the increase.

Exports of anhydrous ammonia will again be up about 10 percent. Ammonium sulfate, ammonium nitrate and urea exports during the first six months were about half as high as in July-December 1960. Awards to domestic producers on AID tenders, plus expected movement to other countries, indicate total nitrogen exports will be at least 19 percent above last year's level. The possibility of additional awards to domestic producers during the last half of 1961-62 could raise the total far beyond this figure.

Table 1. -- NITROGEN: estimated supply of nitrogen for fertilizer purposes, 1960-61 and 1961-62, United States and possessions

(1,000 short tons of N)

Item	1960-61 <u>1/</u>	1961-62
<u>Supply from domestic sources</u>		
Solids:		
Ammonium nitrate <u>2/</u>	450	470
Ammonium sulfate <u>2/</u>	291	341
Urea	153	196
All other solids	276	299
Total solids	1,170	1,306
Liquids:		
Ammonia (including aqua)	918	987
All other	931	943
Total liquids	1,849	1,930
Total (solids and liquids)	3,019	3,236
<u>Imports</u>		
Ammonium nitrate	57	50
Ammonium sulfate	41	45
Urea <u>2/</u>	16	23
Ammonium nitrate-limestone mixtures	19	18
Sodium nitrate	65	65
Nitrogen solutions	18	20
All other	60	65
Total	276	286
<u>Exports</u>		
Ammonium nitrate	11	18
Ammonium sulfate	44	76
Urea	43	50
Ammonia (including aqua)	72	80
All other	43	29
Total	213	253
NET DOMESTIC SUPPLY	3,082	3,269

1/ Revised.

2/ Adjusted for estimated quantity going into non-fertilizer uses.

MONTHLY PRODUCTION OF ANHYDROUS AMMONIA

SHORT TONS

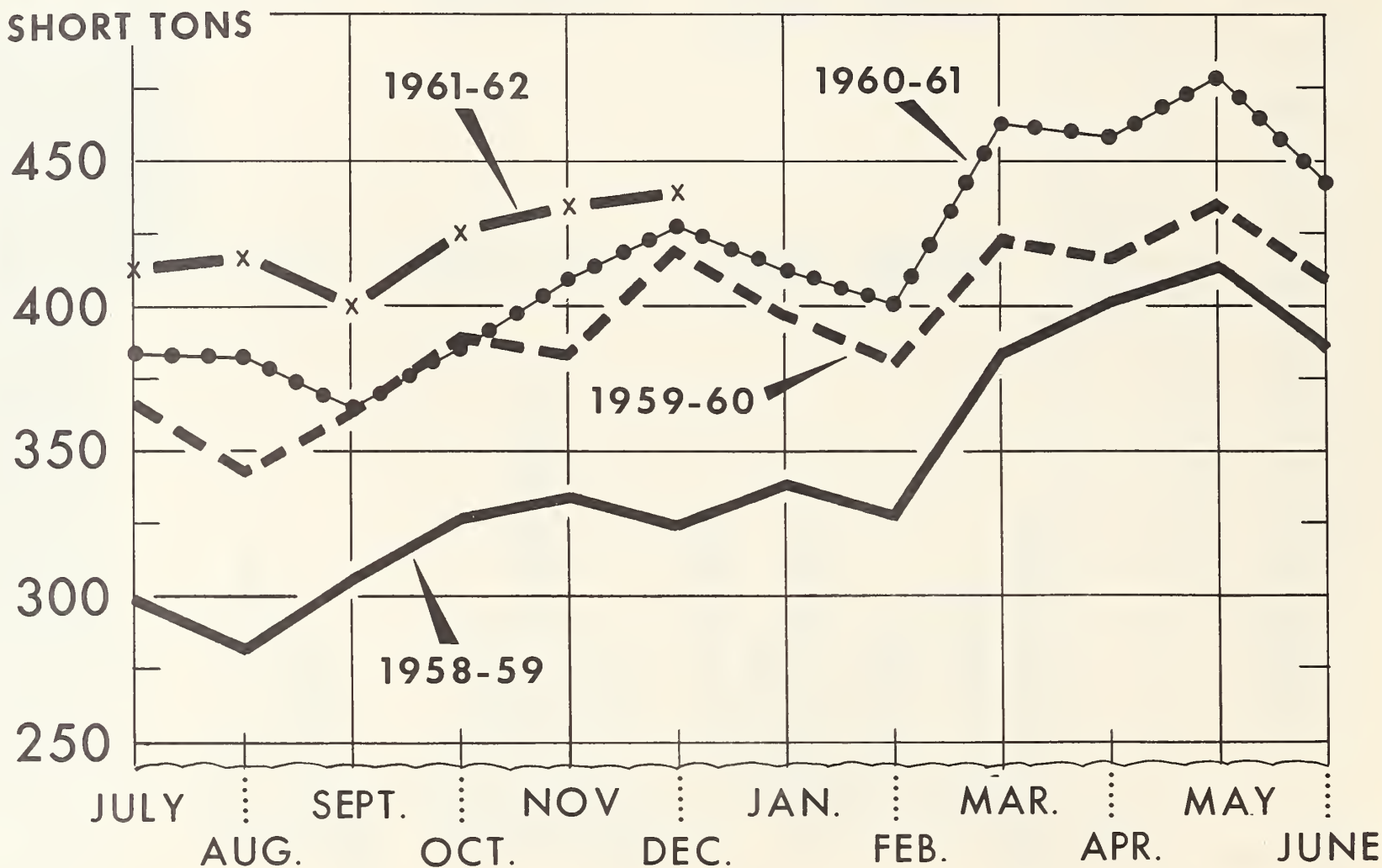


FIG. 1

From 20 plants with an estimated capacity of 1.7 million tons of ammonia in 1951, 62 plants are now on stream with an estimated capacity of 5.9 million tons. Announced construction of new plants and expansions of existing facilities may raise the total to nearly 6.8 million tons before the end of 1963. Urea capacity has been expanded from an estimated 600,000 tons of material in 1957 to about 1.1 million.

Phosphate (P_2O_5)

Phosphate supplies for domestic fertilizers in 1961-62 are expected to total 2,938,000 tons, 8 percent more than in 1960-61 (table 2).

Normal and enriched superphosphate supplies will be about the same as last year, with little change in either production or exports.

Producers of concentrated phosphates have added plant flexibility in many cases by installing coexisting facilities for the production of phosphoric acid, ammonium phosphate and concentrated superphosphate. Phosphoric acid is the basic product and can be supplied as such or in other forms as needed. Concentrated superphosphate (CSP) production has increased each year since 1945 (figure 2). This product requires curing for several weeks although the period may be shortened somewhat if drying equipment is available. CSP requirements, therefore, must be anticipated earlier than is necessary for other concentrated phosphates. Monthly production of CSP has been so erratic during the last three and one-half years that no recurrent pattern is discernible. Rates of production during the first six months and the largest carry-over of CSP in history point toward a 20 percent increase in the total domestic supply over 1960-61. Record inventories were held by producers at the end of each month during the first half of the year. This will result in a reduction in production rates unless some of these stocks are moved soon to meet domestic needs and an anticipated rise in exports. With some new producers on stream ammonium phosphate production is expected to increase during the second half of the year. Production of other phosphates will be up slightly with phosphoric acid for direct application and formulation of mixed fertilizers, both liquid and dry, accounting for most of the gain.

Estimates of the quantities of phosphoric acid for direct application and formulation of dry and liquid mixed fertilizers have been revised. These have been strengthened by bench marks provided by "Trends in Phosphorus and Phosphoric Acid," in the December, 1960 issue of Chemical and Rubber Industry Report, Business and Defense Services Administration, U.S. Department of Commerce, and by "Inorganic Chemicals and Gases - 1960," Current Industrial Reports, Industry Division, U. S. Bureau of the Census. The tonnages of P_2O_5 are

Table 2. -- PHOSPHATE: estimated supply of P_2O_5 for fertilizer purposes, 1960-61 and 1961-62, United States and possessions

(1,000 short tons of available P_2O_5)

Item	1960-61 <u>1/</u>	1961-62
<u>Supply from domestic sources</u>		
Normal and enriched superphosphate	1,244	1,247
Concentrated superphosphate	933	1,120
Ammonium phosphate <u>2/</u>	285	325
All other <u>3/</u>	431	442
Total	2,893	3,134
<u>Imports</u>		
Ammonium phosphate	30	36
All other	37	40
Total	67	76
<u>Exports</u>		
Normal superphosphate	28	31
Concentrated superphosphate	166	214
Ammonium phosphate	34	17
All other	10	10
Total	238	272
NET DOMESTIC SUPPLY	2,722	2,938

1/ Revised.

2/ Liquid and solid ammonium phosphate shipped as such by primary producers.

3/ Includes ammonium phosphate (produced in combination with potash salts to make mixed fertilizers), nitric phosphates, sodium phosphate, wet base goods, calcium metaphosphate, natural organics, phosphate rock and colloidal phosphate, basic slag, and estimates of wet and furnace phosphoric acid for liquid and solid mixed fertilizers and direct application.

PRODUCTION OF SELECTED PHOSPHATIC FERTILIZERS

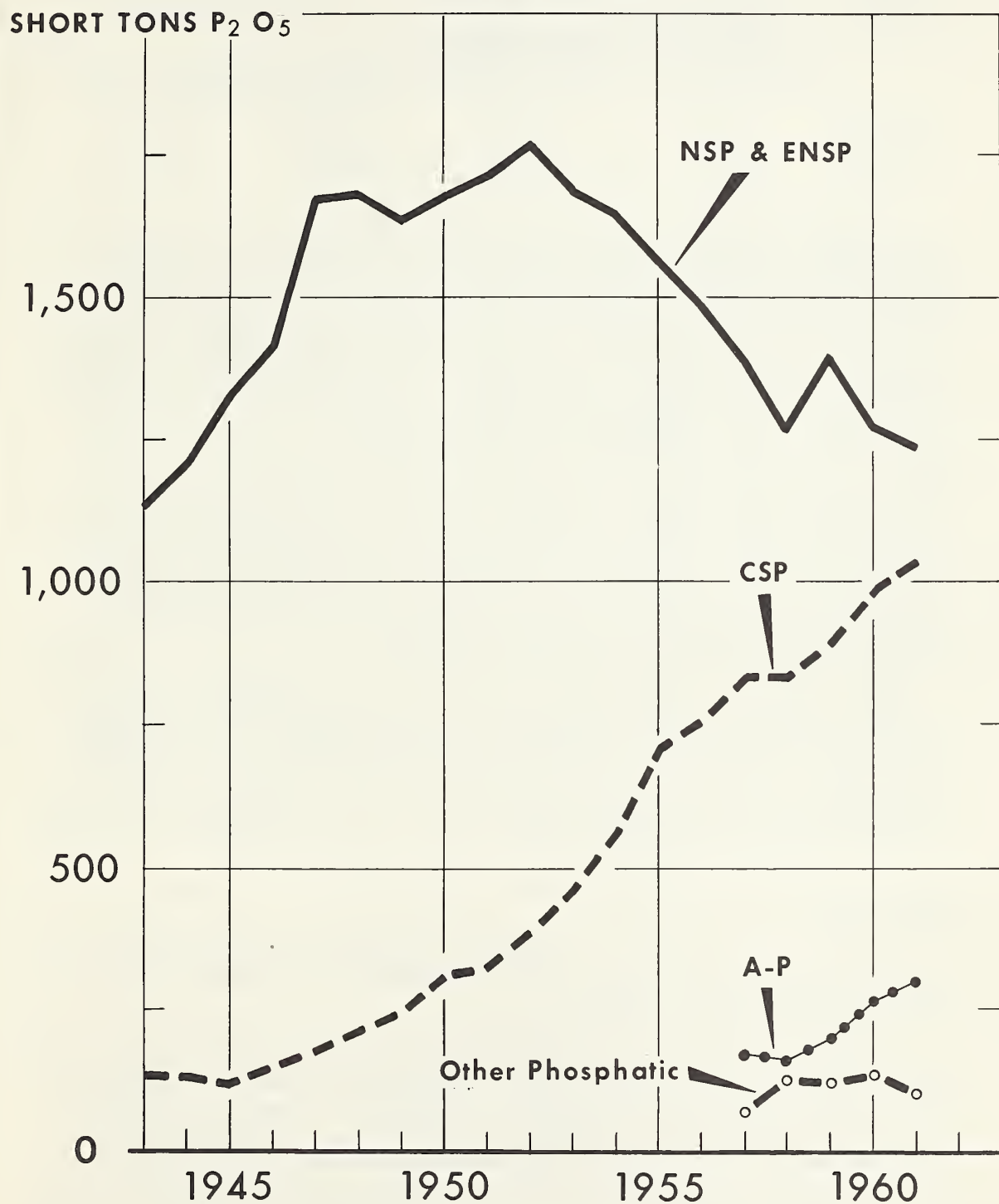


FIG. 2

as follows:

Fertilizer:	Used in direct application :		Total phosphoric acid	
	year :	and formulation of dry and :	for fertilizers	
	:	liquid mixed fertilizers :		
	<u>Wet acid</u>	<u>Furnace acid</u>	<u>Wet acid</u>	<u>Furnace acid</u>
1958-59	87,431	72,705	864,069	133,057
1959-60	141,428	89,122	1,049,978	166,000
1960-61	185,657	91,500	1,191,584	173,843

The large amount of new construction and expansion of facilities begun early in 1960 for the production of concentrated phosphates is expected to be nearing completion by the end of 1962. When one new plant and five expansions of existing plants are completed, about 29 percent will have been added to concentrated superphosphate capacity. The total will approximate 1.4 million tons of P_2O_5 in plants with coexisting phosphoric acid facilities. A number of other firms having modern plants for normal superphosphate production can also produce CSP in their facilities. The ammonium phosphate capacity of about 360,000 tons of P_2O_5 will have risen to over 800,000 tons, with at least nine plants involved. Recently it has been demonstrated that with slight modifications a number of the more modern fertilizer plants can produce ammonium phosphate, again emphasizing the flexibility of the present fertilizer industry. Wet-process phosphoric acid plants, scheduled earlier for a 46 percent increase over the estimated P_2O_5 capacity of 1,348,320 tons on January 1, 1960, may be increased to 2,174,404 tons or by 61 percent.

U.S. production of phosphate rock in 1960 amounted to 17.5 million long tons while world production was estimated at 40.1 million. U.S. exports totaled a mere 233 tons in 1868, but passed the half million mark in 1893. The trend has been upward except for reversals during two world wars and the depression of the early 1930's. Exports in 1960-61 totaled 4,465,094 tons.

Potash (K_2O)

Potash supplies for fertilizers in 1961-62 are expected to total 2,581,000 tons of K_2O (table 3).

Domestic deliveries of potassium chloride (muriate) in the second half of 1960-61 did not nearly meet expectations based on shipments during the first half of the year. In fact, net domestic supply for the year was down about 14 percent from 1959-60. Deliveries during the first half of the current year indicate a gain of about 26 percent over last year and 8 percent over the record quantity in 1959-60. A part of the large increase over a year ago will be to recover a normal stock position. Potassium sulfate is expected to be up again over the previous year.

Table 3. -- POTASH: estimated supply of K₂O for fertilizer purposes, 1960-61 and 1961-62, United States and possessions

(1,000 short tons of K₂O)

Item	1960-61 <u>1/</u>	1961-62
<u>Supply from domestic sources</u>		
Potassium chloride	2,102	2,561
Potassium sulfate <u>2/</u>	132	152
All other	20	20
Total	<u>2,254</u>	<u>2,733</u>
<u>Imports</u>		
Potassium chloride	209	211
Potassium sulfate <u>2/</u>	38	49
All other	38	38
Total	<u>285</u>	<u>298</u>
<u>Exports</u>		
Potassium chloride	456	411
Potassium sulfate <u>2/</u>	18	30
All other	10	9
Total	<u>484</u>	<u>450</u>
NET DOMESTIC SUPPLY	2,055	2,581

1/ Revised.

2/ Includes sulfate of potash-magnesia.

The delivery pattern for potassium chloride in recent years is shown in Figure 3. Deliveries were higher in August, October and December than in those succeeding months when seasonal discounts were reduced or removed. In the current year, however, a price increase became effective February 1st instead of January 1, 1962, and the usual December peak appears to have been postponed to January for that reason. January deliveries were the largest of record, 264,927 tons of K_2O .

Again a record production of potash was attained last year but lower domestic deliveries were not compensated for by the increased exports. Producers' stocks totaled 400,000 tons of K_2O on June 30, 1961, whereas they were only 73,000 tons on June 30, 1960.

Exports of potassium chloride during the first six months of this year were down 10 percent from the same period a year ago. Export requirements for AID and increased shipments to other countries could cause total exports for the year to exceed those in 1960-61, especially since potash is reported to be in tight supply in the world market. Potassium sulfate exports during the same period were more than double those of last year.

Imports of potassium chloride will remain about the same as last year, while potassium sulfate imports are expected to be up nearly 30 percent.

Production capacity has increased by about 350,000 tons of K_2O since January 1, 1960, through expansions or technological improvements in existing plants. New plants under construction in the United States and Canada could swell total North American potash (K_2O) capacity to nearly 4.6 million tons by late 1963 or early 1964.

The first potassium nitrate plant in the United States producing for the fertilizer market is scheduled on stream before the end of June.

FOREIGN TRADE IN FERTILIZERS

The United States not only produces more N, P_2O_5 and K_2O than any other country but is also the world's largest user of each of these plant nutrients. The U.S. fertilizer industry naturally directs its activities chiefly toward the domestic market. Until recently only a few firms have had much interest in the foreign market for fertilizers, but now foreign aid programs provide more general opportunities in this field. Expanded facilities can supply materials for more trade but will require that delivery be planned for the domestic off-season as much as possible.

DOMESTIC DELIVERIES OF POTASSIUM CHLORIDE, BY MONTHS

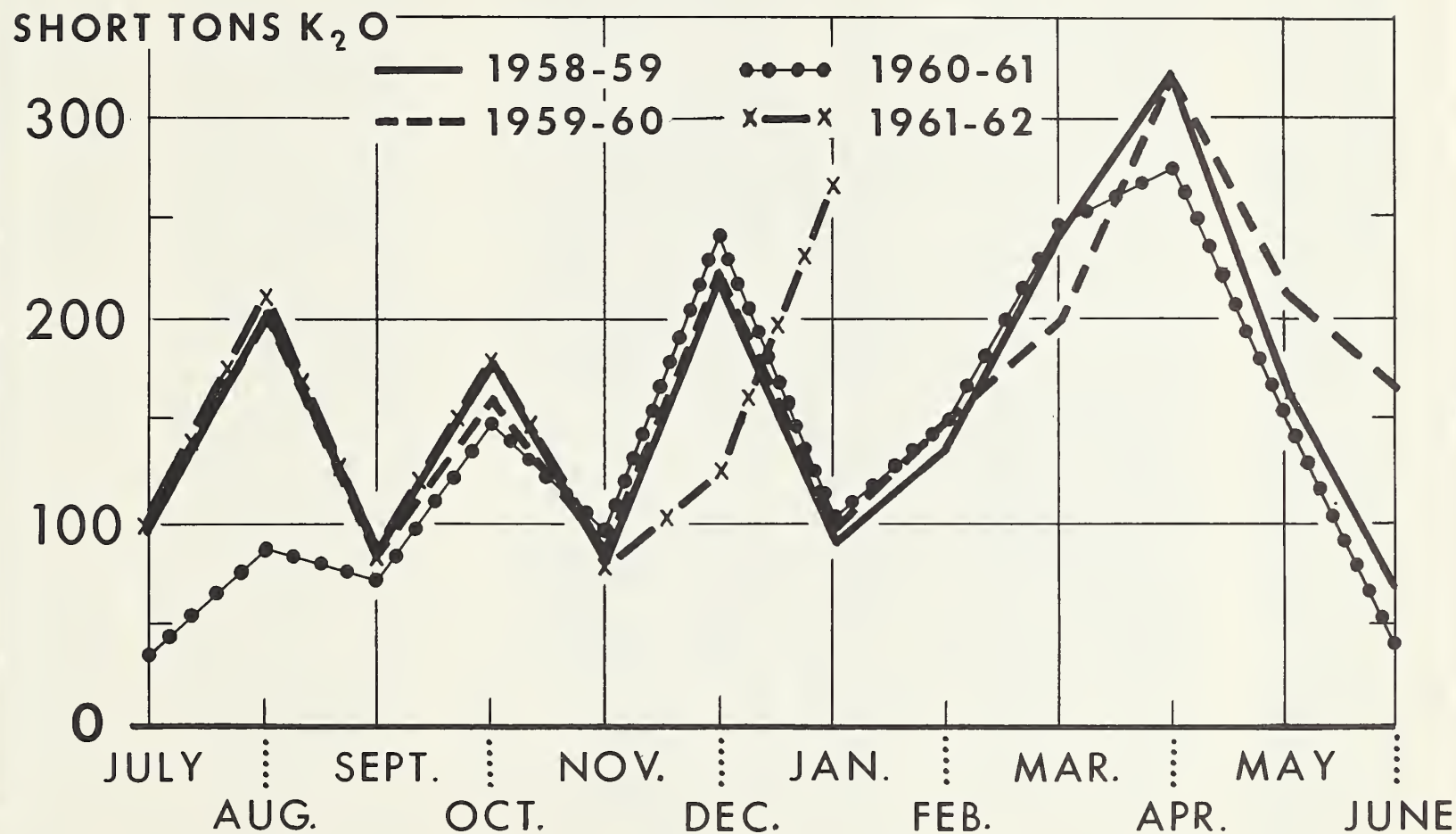


FIG. 3

Countries in which success of the fertilizer industry is dependent on the export market to take a portion of their production are confronted with mounting problems. Several important importing countries are rapidly developing facilities to supply some or all of their own requirements. This would tend to shrink the market for exporting countries.

On a plant nutrient basis, U.S. exports of phosphate and potash materials (not including phosphate rock) are in excess of imports while imports of nitrogenous materials are larger than exports (tables 1, 2 and 3). U.S. production of nitrogen is about 2.5 times that of the next largest producing country in the free world (West Germany), and consumption is about four times that of the next largest consumer (West Germany also). Sodium nitrate, though declining in importance, still comprises over one-fourth of U.S. nitrogen imports. Shipments from Chile have ranged from over 400,000 to more than 2,000,000 tons of material every year except four since 1915. Imports of ammonium nitrate rank next to sodium nitrate. Imports of ammonium phosphate are being shipped into those areas farthest from domestic plants. Calcium cyanamide and calcium nitrate, both imported, continue to be used for specific purposes but the quantities are declining.

World market conditions for nitrogenous fertilizer materials are unsettled. Requirements for AID programs have been shared in the past with countries whose industry had been developed partially on the basis of exporting part of its production. Purchases of fertilizers for distribution abroad under foreign aid programs are now limited to U.S. firms when the latter have supplies available for export. This policy virtually closes some markets previously supplied to a large extent by European and Japanese producers. The European countries and Japan are competing to fill needs of lesser markets and for tenders which importing countries can finance themselves or for which U.S. materials are not available.

Exports of nitrogenous products appeared at one time to be declining, but gained in 1960-61 under the policy of purchasing from domestic producers for foreign aid programs. Anhydrous ammonia which was the exception to this trend continued to gain, its popularity in the United States spreading to neighboring countries. The major foreign exporters deal in solid materials which are offered in vigorous competition on the world market. Sales may often be attributed to one or a combination of factors -- such as active sales organizations, barter arrangements, transportation advantages, balance of payments and price concessions.

Although ammonium sulfate continues to be the leading product in international trade, exports of more concentrated nitrogenous fertilizer materials are growing rapidly. In 1960, about 40 percent of exports by the free world was ammonium sulfate, 21 percent ammonium nitrate, 13 percent complex fertilizers, 9 percent calcium

nitrate, 5 percent ammonium sulfate nitrate, 3 percent urea, and 5 percent miscellaneous materials.

Imports of phosphatic materials are small and primarily from plants near our borders. Most exports of processed products are to countries in the Western Hemisphere and recently to those where we have active aid programs.

Potash imports from Europe are confined to the East Coast because their competitive position vanishes rapidly as transportation costs mount with movement into the interior. A part of imports from Canadian production will be by affiliates of domestic producers. U.S. exports of potash rose sharply last year through the efforts of domestic producers to develop additional markets in anticipation of production from the new facilities in Canada. Construction difficulties delayed completion of the Canadian facilities, commitments abroad being met from U.S. production.

Most U.S. fertilizer imports are from Canada, except for specific products (table 4). Chilean nitrate of soda continues to be our largest nitrogen import. The Netherlands, Norway, Italy and West Germany have been the principle sources of ammonium nitrate-limestone and calcium nitrate. Most countries exporting urea sent some to the United States last year. Potash from West Germany, France, Spain and the Soviet Union in 1960-61 was used on the eastern seaboard.

Detailed information on products exported and countries of destination is given in Table 5. The quantities going to many countries are small, but their introduction and the demonstration of benefits from using these fertilizers are means of creating markets.

Table 4. -- U. S. Imports of Fertilizer Materials by Country of Origin, 1960-61 ^{1/}
(short tons of material)

Country of Origin	: Ammonium : sulfate	: Ammonium : nitrate : 32% & less	: Calcium : nitrate	: Urea	: Synthetic : nitrogenous : materials	: Phosphate : crude	: Potassium : chloride	: Potassium : sulfate	: Potassium : sodium- : nitrate	: Fertilizer : substances
Canada	138,542	--	--	33,381	16,437	--	2	--	2	11,648
Mexico	--	--	--	--	--	6,445	--	--	--	9,636
Netherland Antilles	--	--	--	--	--	139,934	--	--	--	--
Chile	--	--	--	--	--	--	--	--	20,269	35,234
Brazil	--	--	--	--	--	--	--	--	--	513
Norway	--	597	28,576	10,424	7,633	--	--	--	--	6
United Kingdom	--	--	--	6,088	--	--	--	--	--	128
Netherlands	20,699	67,368	36,804	10,022	500	--	--	--	--	--
Belgium	9,921	--	555	8,383	200	--	4,689	1,827	--	--
France	3,329	827	--	--	--	--	117,561	30,446	--	--
West Germany	21,309	8,692	11,607	16,765	3,365	--	148,182	38,023	190	1,453
Switzerland	--	--	--	868	--	--	--	--	--	--
U.S.S.R.	--	--	--	--	--	--	26,532	--	--	--
Spain	--	--	--	--	--	--	51,059	--	--	--
Italy	--	13,626	--	1,086	--	28	--	5,667	--	2
Japan	--	--	--	2,795	--	--	--	--	--	--
French Pacific Islands	--	--	--	--	--	11,170	--	--	--	--
OTHER	--	--	200	450	--	92	--	--	--	28
TOTAL	193,800	91,100	77,742	90,262	28,135	157,669	348,025	75,963	20,461	58,648

^{1/} Other materials imported were: 15,461 tons of castor pomace from Brazil and West Germany; 3,521 tons of guano, mostly from Peru; 408,246 tons of sodium nitrate from Chile; and mainly from Canada the following: ammonium nitrate (over 32%) 170,753 tons, nitrogen solutions 60,453 tons, calcium cyanamide 43,856 tons, ammonium phosphate 102,038 tons, normal superphosphate 2,059 tons, concentrated superphosphate 1,063 tons, ammoniated superphosphate 167 tons and mixed fertilizers 297,943 tons. Small imports of organic materials and potash salts are not listed.

Table 5. -- U. S. Exports of Selected Fertilizer Materials by Destination, 1960-61
(short tons of material)

Destination	: Ammonium : sulfate	: Anhydrous : ammonia & : aqua (NH ₃ : content)	: Ammonium : nitrate	: Urea	: Phosphate : rock (all)	: Normal : super- : phosphate	: Concentrated : super- : phosphate	: Potassium : chloride	: Ammonium : phosphates	: Mixed : fertilizers
Canada	2,523	7,206	55	1,738	990,284	118,525	63,825	64,540	13,436	7,574
Mexico	8,567	72,251	19,648	7,694	62,682	390	32,134	14,332	7,755	17,725
Central America	424	5	190	8,301	572	738	2,789	534	6,313	16,292
Cuba	15,822	5,310	--	--	13,048	6,700	12,739	16,721	--	63
West Indies, British	49	--	155	4	30	270	178	210	60	6,420
West Indies, Other	19,151	8	320	902	--	16	5,384	5,435	200	2,224
Colombia	4,534	--	55	1,046	2,811	--	4,134	550	822	9,163
Venezuela	1,656	19	--	153	3,498	584	11,200	--	930	4,550
Peru	241	--	5,010	20	20,799	1,102	135	55	154	172
Chile	--	--	--	168	3,259	--	64,944	--	280	--
Brazil	62,877	--	--	442	44,570	8,308	49,084	48,774	--	8
Uruguay	3,687	--	--	--	20,572	--	--	--	--	--
Argentina	3,867	--	--	5	--	1,328	499	1,170	--	602
South America, Other	10	--	6,147	1,081	--	33	314	67	1,429	2,131
Sweden	--	25	4	--	54,341	--	--	--	--	--
Denmark	106	--	--	--	44,341	--	--	--	--	--
United Kingdom	--	--	--	--	288,732	--	6	8,948	3,404	--
Netherlands	--	--	--	--	208,618	--	19,037	--	5,484	32
West Germany	--	--	--	--	332,952	--	385	--	--	6
Finland	--	--	--	--	22,476	--	--	--	--	--
Spain	12,790	--	--	--	43,944	--	--	--	220	--
Italy	--	--	--	30	670,838	--	--	24,808	--	141
Greece	28	--	--	27	44,040	--	--	--	1,100	122
Europe, Other	10,136	--	7	--	22,381	--	2,007	6,724	--	24
India	4,468	--	--	8,960	8,955	--	--	--	--	--
Pakistan	--	--	--	6,639	--	--	12,713	--	--	--
Indonesia	--	--	--	--	--	--	19,865	--	--	4
Philippines	21,212	2,492	490	588	12,093	--	3,307	4,532	21,350	833
Korea	31,982	--	--	58,568	14,585	--	50,819	181	39,227	--
Taiwan	--	--	275	--	2,783	--	--	18,714	14,492	15,969
Japan	--	--	--	--	1,526,564	--	--	450,522	--	10
Asia, Other	5	--	500	26	4,374	2,755	5,987	235	1,644	1,797
Australia	--	--	179	--	--	--	--	5,713	89	266
New Zealand	--	--	--	35	--	--	--	69,189	170	329
Union of South Africa	4,021	--	--	2	982	--	--	18,832	329	4
Africa, Other	1,000	445	361	--	--	--	--	5	2	--
OTHER	11	21	111	192	--	--	--	--	35	185
TOTAL	209,167	87,782	33,507	96,621	4,465,124	140,749	361,485	760,791	118,925	86,646

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Growth Through Agricultural Progress